March 13, 1973 C. E. CORCHRAN 3,720,441

DOUBLE CURVATURE PLYWOOD SHEET FOR BACK REST

Filed April 7, 1971 2 Sheets-Sheet 1

Fig. 1.

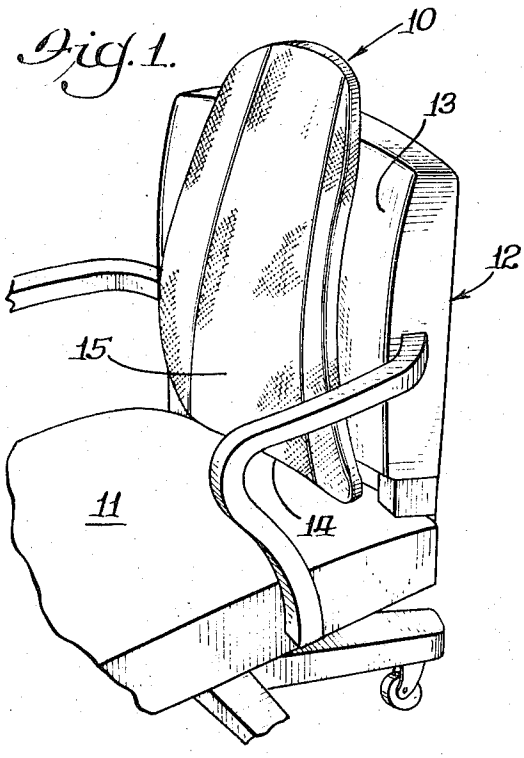
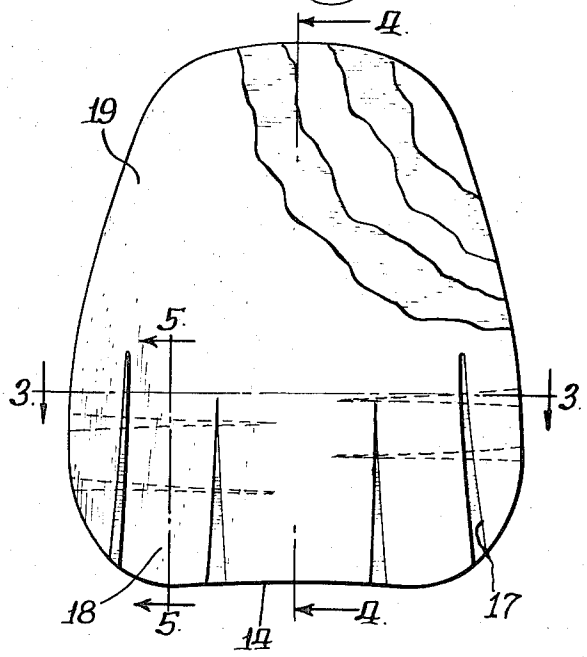


Fig. 2.



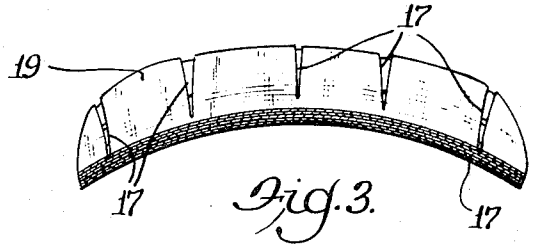
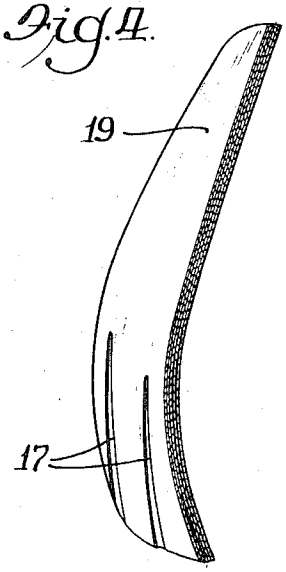


Fig. 3.

Fig. 4.



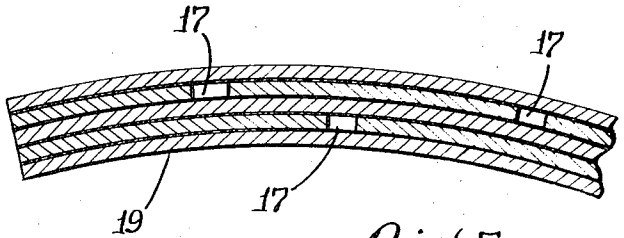


Fig. 5.

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Fig. 7.

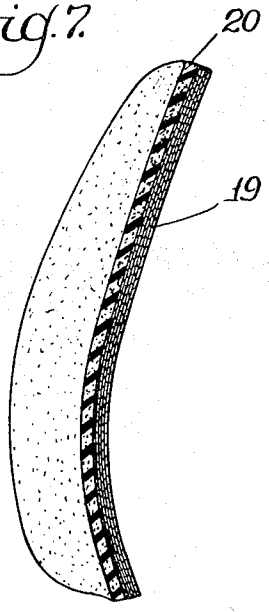


Fig. 6.

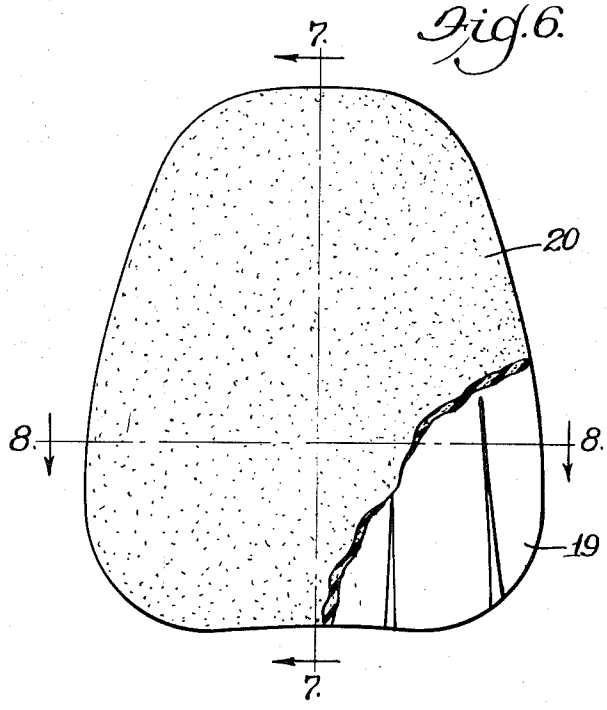


Fig. 8.

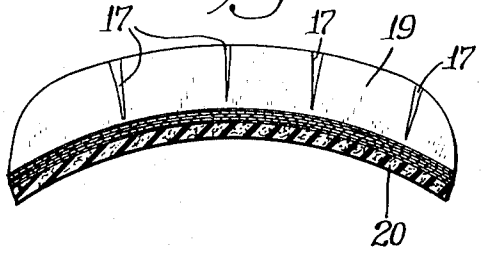


Fig. 9.

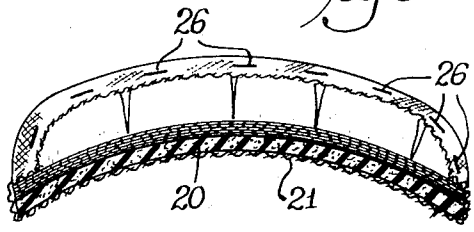


Fig. 10.

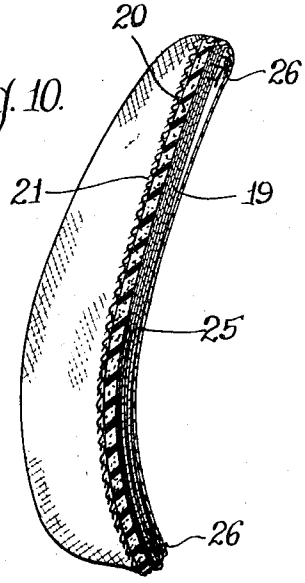
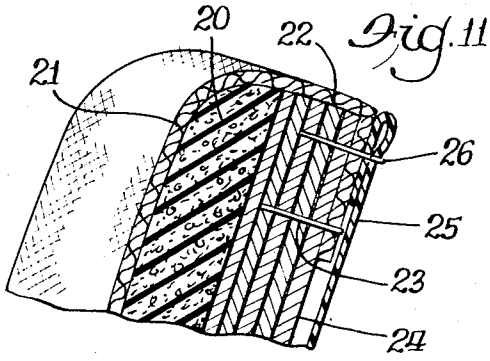


Fig. 11.



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DOUBLE CURVATURE PLYWOOD SHEET FOR BACK REST

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Int. Cl. A47c 3/00
U.S. Cl. 297—284 5 Claims

ABSTRACT OF THE DISCLOSURE

The disclosure describes a rigid sheet of plywood formed to have a double curvature. One use described is as a portable back rest, padded with a soft material of uniform thickness, such as foam rubber, which is then provided with an over-cover of an upholstering material suited to the environment in which the back rest is to be used. In the forming of the double curvature the plywood plies are steamed and assembled progressively in dies having curvatures shaped to conform to the double curvature of the user's lower back. To accomplish the double curvature in what is substantially non-stretchable plywood the plies are slit over the second curvature to allow the ply to spread thereover and conform to the increased area of said second curvature. The outer covering may be a water-repellant plastic material for use outdoors, or it may be an upholstery material where the back rest is to be used indoors with overstuffed furniture or the like which is improperly contoured for properly supporting a user's back.

This invention relates to plywood sheets having a double curvature and to their use as portable back rests to be used with chairs, settees, divans, car seats, theater or stadium seats or the like.

Most chairs are made with a contour designed without particular regard for the correct support of the user's spine, which leads to discomfort or plain after a period of use, or upon rising from the chair. This is particularly true for persons having the low back syndrome, and for elderly persons. The syndrome may be due to such varied conditions as acute lumbar strain, osteroarthritis and herniated discs. Such persons may have special devices or chairs in their homes which they may use to alleviate their condition, but when they leave their homes, they are generally without relief until they return. Any prolonged use of chairs not conforming to the ones in their homes, results in pain and makes travel in an automobile, bus, boat or other conveyance, or stay in strange quarters, unpleasant, if not painful.

The provision of a portable back rest which may be carried from place to place poses a problem in that the back rest must be rigid and strong enough to retain its shape regardless of where it is used, and yet it must be light enough to be easily carried. It must also be soft enough to avoid inflicting pain where the user's bone structure contacts its surface. The joint requirements of rigidity and softness can only be met by the use of a rigid base the bone-contacting surface of which is padded.

Rigidity can be obtained with the use of cast metal, dieformed relatively heavy sheet metal, molded plastics, or wood carved to have the desired shape. All of these are either expensive or heavy, or readily deformable, so that they don't maintain their proper contour. Plywood has the desired characteristics of lightness and low cost, but heretofore, it has not been available in a double curvature such as is required in a back rest.

It is accordingly an object of this invention to provide a sheet of plywood having a double curvature suitable for use in back rests or the like.

Another object of this invention is to provide a portable back rest which is light in weight, which is correctly contoured for properly supporting a user's back, and which retains its contour regardless of the particular construction of the chair, seat, divan, etc. with which it is used.

As a more specific object, this invention seeks to provide a rigid sheet of plywood having a generally concave curvature in horizontal cross section and a generally convex curvature in vertical cross section, said sheet being suitable for use as the base of a padded, portable back rest.

A further object of this invention is the provision of a portable back rest having a double curvature suitable for use by patients having a low back syndrome due to such varied conditions as acute lumbar strain, osteroarthritis and herniated discs, said back rest having a rigid plywood base, foam rubber padding and a wear-resistant cover.

These and other objects of this invention will become apparent from the following detailed description of a preferred embodiment thereof when taken together with the accompanying drawings in which:

FIG. 1 is an elevation in perspective of a fragment of a swivel chair on which the back rest of this invention is placed for supporting the back of an occupant of the chair;

FIG. 2 is an enlarged front elevational view of the plywood base of the back rest of FIG. 1, with the plies progressively cut away;

FIG. 3 is a horizontal sectional view through the plywood base of FIG. 2 taken along line 3—3 of FIG. 2;

FIG. 4 is a vertical sectional view through the plywood base taken along line 4—4 of FIG. 2;

FIG. 5 is an enlarged fragmentary sectional view through the plies of the plywood base taken along line 5—5 of FIG. 2;

FIG. 6 is a front elevational view of the back rest with the foam rubber padding applied to the plywood base, a portion of the padding being cut away to show the base;

FIG. 7 is a side elevational view in section of the padded back rest of FIG. 6, the section being taken along line 7—7 of FIG. 6;

FIG. 8 is a horizontal section through the padded back rest, the section being taken along line 8—8 of FIG. 6;

FIG. 9 is a horizontal section similar to FIG. 8, but showing the outer covering applied to the foam rubber padding;

FIG. 10 is a vertical section similar to FIG. 7, but showing the outer covering applied to the foam rubber padding; and

FIG. 11 is an enlarged view of the upper portion of FIG. 10.

The essential feature of the present back rest is a plywood base of a size to support a chair-occupant's middle and lower back, the base having a principally concave contour from top to bottom in horizontal cross section, and a convex contour over its lower region in vertical cross section, the overall contour being designed to conform with the desired contour of a correctly seated occupant's back. The plywood is light in weight for easy portability and is rigid to retain its contour. The double contour, which is unique in plywood, is obtained by slitting the plies along their grain over the region having the convex contour to make possible a controlled expansion of these plies. The slit plies are alternately assembled as between vertical and horizontal grain and glued together while they are in a pliant condition, e.g., while softened by stream and the whole compressed and dried between appropriately contoured dies. The dried contoured plywood is then cut to the desired outline, and then padded and covered to form the finished back rest.

Referring now to the drawings for a detailed description of the preferred form of the invention shown therein,

the back rest is shown at **10** in FIG. 1, standing on its bottom edge on the seat **11** of a swivel chair **12** and leaning against the back **13** of said chair. It is understood that back rest **10** may be applied equally as well to other chairs or seats, such as automobile seats, living room divans and chairs, seats in public places such as sports stadia, assembly halls and theaters, restaurants, etc. Back rest **10** is formed with a concave bottom edge **14** (FIG. 1) to conform to the convex seat surfaces usually found on upholstered chairs, said edge **14** giving the back rest stability when the rest is placed on a chair and preventing said rest from rolling over to one side or the other of the chair. It may be noted from FIG. 2 that the bottom regions of the rest are wider than the top regions, which also contributes to the stability of the rest when it is in use.

Rest **10** has a generally concave contour in horizontal section over its entire vertical dimension, and a generally convex curvature in vertical section at the region **15** a short distance above bottom edge **14**, said convex curvature being designed to follow the curvature of the lower spine of an occupant of the chair **10**. As will be hereinafter described in greater detail, the front or exposed surface of the back rest **10** is padded and covered for comfort and durability. Since chairs and seating devices generally have a rearward and upward sloping back, the back rest **10** is simply leaned against the chair back and requires no other support to hold it in any selected angular position.

The principal element of the back rest **10** is a plywood base **19** shown in FIGS. 2–5. Although other materials, such as plastics and metal, have been suggested for back rests, they are either too heavy for a portable back rest or too fragile, if made light enough, and when properly made of metal or plastics, more expensive than plywood. A flat sheet of plywood, however, cannot be steamed and die-formed to have a double curvature such as is required for back rest **10**, since the convex curvature superimposed upon a concave curvature requires that the plies expand or spread out over the convex region, and this cannot be done with plies that cannot stretch.

The problem of expanding the plies over the convex regions thereof imposed by the double curvature has been solved in the present back rest by forming each ply individually rather than by working with multi-ply sheets. Each ply is slit with a plurality of slits over the region thereof to be given a convex curvature. The slit plies in rectangular form are then steamed to render them flexible and assembled progressively while flexible, with appropriate adhesive between the plies. As in all plywood, the plies are turned alternately 90° for maximum strength and rigidity. The whole is compressed between dies having the required contours. The slits are shown at **17** in FIGS. 2, 3 and 4. The slits leave sections **18** of the plies between them which remain intact and do not need to stretch, but the required expansion of the ply is accommodated by a separation of the sections **18**. The separation leaves diverging spaces between the sections **18**. In the form illustrated, five plies are used, resulting in a base which is approximately 3/16" thick.

A double curvature is required of both the vertically grained and horizontally grained plies in the backrest illustrated, though not necessarily over the same regions. This requires slits running crosswise of one another in adjacent plies, and it is contemplated that slits in plies grained the same way will be staggered to avoid creating connected openings passing through the entire base. After the assembled and contoured plies have been dried and adhered to form a single plywood sheet of rectangular form, the base is then cut to give it the outline shown in FIG. 2. The completed formed base **19** has the curvature or contour shown in FIGS. 2–5, and it retains this contour indefinitely despite continued use in the back rest **10**.

The contoured plywood base **19** is padded on its front surface preferably by a layer of foam rubber **20**, shown

in FIGS. 7–11. Said layer of foam rubber may be of any thickness desired, or recommended by a physician, and is conveniently and generally of uniform thickness, although it may itself be contoured to provide adequate padding at regions contacted by the angular or protruding bone structure of an occupant. Other padding material may be used if desired. When made of a coherent material such as foam rubber, padding **20** may be adhered to the front surface of plywood base **20** by an appropriate adhesive.

Padding **20** is protected from wear by a cover **21** of leather, plastic, cloth or other upholstering material which is stetched over padding **20** and around the edge thereof as well as over the exposed edge **22** of the plywood base **19**, and then tacked or stapled as at **23** to the back surface **24** of said base. If desired, the back surface **24** of base **19** may be covered by other upholstering material **25** to enhance the appearance thereof, said other material **25** being similarly secured to base **19** by tacks or staples **26**.

The finished back rest of this invention provides a rigid, light-weight, inexpensive, durable and portable support for the back of the occupant of a chair, car seat, pew, stadium seat or the like which back rest is contoured for maximum comfort and alleviation of lower back syndrome.

Although this invention has been described with reference to its application to back rests, the dual curvature plywood can be used for ornamental purposes, as forms for plastic or hardenable materials, or for various industrial purposes. The scope of the invention therefore is not to be limited to the form illustrated herein, but is to be determined by the appended claims.

I claim:

1. A rigid sheet of plywood having superposed and adhered plies each disposed with its grain running substantially at right angles to the adjacent ply, said sheet having a concave curvature in cross section in one direction and a convex curvature in cross section in a direction intersecting the first direction, said plies having slits formed therein running in the direction of the grain thereof from the edge of the sheet inward and terminating before reaching the opposite edge of the sheet and extending substantially over the convex curvature of said plies.

2. A rigid sheet of plywood as described in claim **1**, the cross section of the convex curvature running substantially at right angles to the direction of the cross section of the concave curvature, and said convex curvature extending over only a portion of said sheet.

3. A rigid sheet as described in claim **2**, the direction of the concave curvature being horizontal, and the direction of the convex curvature being vertical and extending over the lower portion of the sheet.

4. A rigid sheet of plywood as described in claim **1**, the concave and convex curvature providing a dual contour on one surface of said sheet to conform to the curvature of the lower back of an individual, said sheet being of a size to fit against the back of a seat to form a back rest.

5. A rigid sheet of plywood as described in claim **1**, the lower edge of said sheet having a concave shape and comprising the supporting edge of said sheet, said concave lower edge providing stability for said sheet.

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